

CubeSat High Impulse Propulsion System (CHIPS), Phase II

Completed Technology Project (2014 - 2017)



Project Introduction

CU Aerospace proposes to perform design, fabrication, and ground test validation of a nanosat primary propulsion subsystem using non-toxic R134a propellant. Our approach, called CubeSat High Impulse Propulsion System (CHIPS), leverages CU Aerospace's very high efficiency warm-gas variant of an innovative resistojet that significantly boosts the performance of standard cold-gas systems with the existing Micro Propulsion System (MiPS) thruster technology development by our team partner, VACCO Industries. The MiPS system has been tested to 200,000 cycles without any technical issues, demonstrating excellent reliability. A 1.5U CHIPS subsystem, using non-toxic R134a propellant, is a compact thruster system having a total impulse of 680 N-s and a fully throttleable continuous thrust of 30 mN. The subsystem also includes an R134a 3-axis cold-gas attitude control system to replace reaction wheels. Approximately 25 W of primary power is required from a lithium-ion battery included in the 1.5U package. This low-cost subsystem demonstration will pioneer a family of nanosat propulsion systems, which will become available to the CubeSat and nanosatellite communities for orbit change, de-orbit, precision maneuvering, and drag makeup missions.

Primary U.S. Work Locations and Key Partners

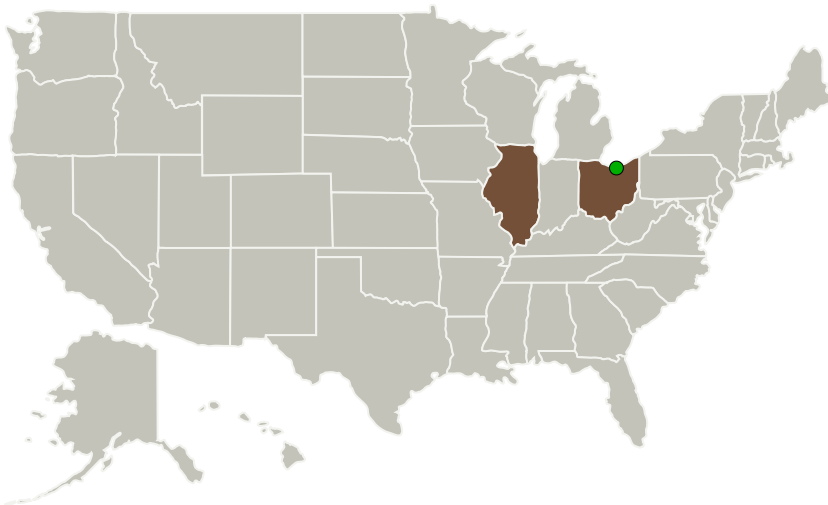


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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CU Aerospace, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:


Carlos Torrez

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Organizations Performing Work	Role	Type	Location
CU Aerospace, LLC	Lead Organization	Industry	Champaign, Illinois
 Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Illinois	Ohio

Images

Briefing Chart Image

CubeSat High Impulse Propulsion System (CHIPS), Phase II
(<https://techport.nasa.gov/image/134651>)

Project Management (cont.)

Principal Investigator:

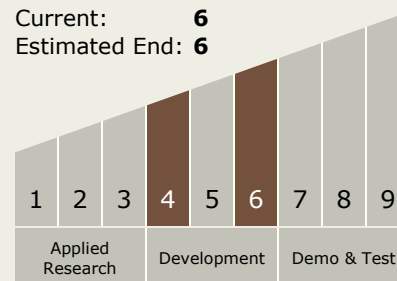
David L Carroll

Co-Investigator:

David C Carroll

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - TX01.1 Chemical Space Propulsion
 - TX01.1.8 Warm Gas

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System